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Correlation Copetin Biomarker with Length of Stay Patient Community Acquired Pneumonia

Harsini[1,2], Ikhlas Muhammad Jenie[3], Arlina Dewi[4]

[1] Master of Hospital Management, Postgraduate, Universitas Muhammadiyah Yogyakarta, Indonesia
[2] Department of Pulmonology and Respiratory Medicine Medical Faculty of Sebelas Maret University, Indonesia
[3] Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia
[4] Master of Hospital Management, Postgraduate, Universitas Muhammadiyah Yogyakarta, Indonesia

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Corresponding Author:
Harsini

ABSTRACT

Background: Pneumonia is an inflammation of lung parenchyma caused by virus, bacteria, fungus and parasite. Treatment efficiency at hospital can be evaluate by clinical pathway that is evidence based tool for guiding health that is established internationally since 1980's. Copeptine biomarker measurement can be used as tool for CAP clinical pathway evaluation. This study objective is to find out that correlation copeptine biomarker with length of stay patient community acquired pneumonia in Moewardi hospital. Subjects and methods: A mixture of correlative quantitative design between biomarkerof copetine, length of stay and action research. Subjects were taken from the medical record data of community acquired pneumonia patients who were examined for copeptin levels in 2018 followed by action research conducted in two cycles. Results: It was obtained 25 CAP patients examined copeptine levels were then associated with length of stay which found a positive and significant relationship with length of stay with the strength of strong category relationships (r=0,600; p =0,001). From these results it was found that copeptin biomarker levels were able to estimate the length of stay of community acquired pneumonia patients. The result of the action research was that disapproval of copeptine levels was included in the clinical pathway for community acquired pneumonia patients because it was expensive but there was an improvement in the implementation of clinical pathway evaluation in dr. Moewardi hospital by involving all professional care providers namely doctors, nurses, nutritionist and pharmacist. Conclusion: There is a relationship between copeptine biomarkers and length of stay in community acquired pneumonia patients and there is an improvement in the implementation of CP evaluation in Dr. Moewardi Regional Hospital.

KEYWORDS: Community Acquired pneumonia, Clinical pathway, Copeptin

I. INTRODUCTION

Pneumonia is an inflammation of the lungs that can be caused by various types of microorganisms such as bacteria, viruses, fungi, and parasites.[1] Pneumonia is a health problem in the world because of the mortality rate is high, not only in developing countries but also in developed countries such as the United States, Canada, and other European countries. Community acquired pneumonia is the leading cause of death from infectious diseases. Pneumonia is often found as an outpatient and inpatients which is in hospital mortality is 5% to 15% and increased to 20% to 50% for care in intensive care units (ICU). Costs incurred to treat pneumonia vary depending on administration therapy and length of stay. Community acquired pneumonia that is not treated efficiently leads to increased care costs.[2] [3]

Biomarkers have been found to improve the level of risk and management of CAP. Recently, new biomarkers such as midregional proadrenomedullin (MR-proADM) and proarginin vasopressin (copeptin) can predict 28 days of death or 30-day complications in CAP patients.[4]

Providing high quality medical services is the ultimate goal of hospital services. Patient demand for quality service, low costs for hospital service and efforts to maximize customer satisfaction is the focus of providing high quality health services by increasing hospital productivity.[5]

Clinical pathways provide observation and as a clinical standard in clinical patient management programs with the aim of reducing variations in care, optimizing cost effectiveness, improving patient outcomes, and improving patient and family education about care. [6] The clinical evaluation of community

acquired pneumonia pathway in dr. Moewardi Hospital in 2017 found that there was a lot of variation in the length of stay for both patients in the regular ward and in the ICU. Based on this variation we need a biomarker that can be used to estimate the length of stay. This action research study is to obtained corrected way and involved the hospital unit in the process of changing the clinical pathway of community acquired pneumonia in dr. Moewardi hospital.

II. RESEARCH METHOD

This research is a mixture of quantitative and qualitative research with action research design to evaluate clinical pathway of community acquired pneumonia by including examination of copeptin levels. Action research is research on problem solving or improvement efforts that are designed using reflective and collaborative action research methods. The procedure of conducting action research in the form of a cycle or recycling spiral form, each of which consists of four stages, namely planning, action, observation and reflection. [7]

This study was conducted at dr. Moewardi hospital in April - May 2019. Subjects were CAP patients who were examined for copeptin in 2018 by looking at medical record data, pulmonary department medical staff, members of the medical committee and medical services staff at dr. Moewardi hospital. The dependent variable is length of stay with units of days and the independent variable is copeptin levels with units: pgr / L. The normal value of copeptin levels is 1.70-11.25 pmol / L. then proceed with action research.

III. RESULT AND DISCUSSION

Dr. Moewardi general hospital is the largest Class A Education hospital in Central Java Province owned by the Government of Central Java Province and a referral center for the former Surakarta residency and surrounding areas, as well as the West and East Java Provinces with the main mission is being excellent in the field of health services, another function also in education and research.

This study found the length of stay was taken from the average treatment was 9, 28 (10 days), this study was divided into two lengths of stay of more or less 10 days. Based on the results of the study we found that female subjects with a duration of stay <10 days there were 8 patients (53.3%) and with a length of stay >10 days there were 6 patients (60.0%), subjects with male sex with duration of stay <10 days there were 7 patients (46.7%) and with length of stay> 10 days there were 4 patients (40.0%), with a value of p = 1,000 (p> 0.05).There were no significant differences in characteristics subjects by sex between patients with a length of stay <10 days with a length of stay> 10 days. The average age of patients was 58.27 +19.36 years with a length of stay <10 days, while the average age of 60.50 + 13.58 years in patients with a length of stay >10 days p value = 0.755 (p> 0.05) there were no differences in the baseline characteristics of subjects based on age between patients and length of stay.

The variables of education, occupation, smoking history, BMI, concomitant diseases, was found with a p value of p> 0.05, showed that there was no significant difference in the basic characteristics of the study subjects between patients with length of stay <10 days with length of stay >10 days. Characteristics of research subjects based on length of stay showed in table 1. Copeptin levels obtained with OR values = 36.000 (3.193-405.897) which means that pneumonia patients with copeptin levels >23.21 have a risk of 36.000 (3,193-405,897) times greater than length of stay >10 days compared to patients with copeptin levels <23, 21. Fisher exact test results p = 0.001 (p <0.05), it means that there is a significant relationship between copeptin levels and length of stay of CAP patients, copeptin levels can be used as a predictor of length of stay showed in table 2. The results achieved only see variations in the clinical pathway and have not been followed up for changes and evaluation of clinical pathways. The clinical pathway changes have not been the same every department according to every department version.

Table 1. characteristics of studysample

Variable Characteristics		**Duration of length of stay**		**P**
		≤ 10 days (%)	**≥ 10 days (%)**	
Gender	1. Male	8(53.3)	6(60.0)	1.000
	2. Female	7(46.7)	4(40.0)	
Age		58.27	60.50	0.755
		±19.36	13.58	
Education	1. Primary school	6(40.0)	5(50.0)	0.743
	2. Junior high school	2(13.3)	1 (10.0)	
		6 (40.0)	3(30.0)	
	3. Senior high school	1 (6.7)	1 (10.0)	
	4. University			

Variable Characteristics		Duration of length of stay ≤ 10 days (%)	≥ 10 days (%)	P
Work	1. Labor	4 (26.7)	2 (20.0)	0.793
	2. Housewife	3 (20.0)	3 (30.0)	
	3. Retired	1 (6.7)	0 (0)	
	4. Farmer	2 (13.3)	2 (20.0)	
	5. Government	0(0)	1 (10.0)	
	officer	2 (13.3)	1 (10.0)	
	6. Private employee	3 (20.0)	1 (10.0)	
	7. Enterpreuner			
Smoking degree	1. Non smoker	8 (53.3)	5 (50.0)	0.694
	2. Mild	1 (6.7)	0 (0)	
	3. Moderate	3 (20.0)	2 (20.0)	
	4. Heavy	3 (20.0)	3 (30.0)	
BMI	1. Underwight	4 (26.7)	3 (30.0)	0.741
	2. Normal	7 (46.7)	5 (50.0)	
	3. Overweight	4 (26.7)	2 (20.00	
Comorbid	1. Asthma	1 (6.7)	0 (0)	0.547
	2. Ca ovarii	1 (6.7)	1 (10.0)	
	3. Pleural Effusion	1 (6.7)	3 (30.0)	
	4. Hipertensi	0 (0)	1 (10.0)	
	5. COPD	3 (20.0)	0 (0)	
	6. Tumour	2 (13.3)	3 (30.0)	
	7. None	7 (46.7)	2 (10.0)	

A. Overview of Cycle 1 results (April 2019) issues

In this phase the researcher identified the problem of implementing clinical pathway community acquired pneumonia in the pulmonary department of Dr. Moewardi hospital, including looking at the medical record data of community acquired pneumonia patients in 2018 who were examined for their copeptin levels. Collecting data from medical records and analyzing results such as the patient's profiles and entering of the data collection.

Data / fact collection stage

Data on medical records of community acquired pneumonia patients obtained various in length of stay from 6 to 12 days were analyzed. We submit a proposal to the pulmonary department for clinical pathway evaluation by entering the level of copetin included in the community acquired pneumonia clinical pathway sheet.

Action planning stage

The pulmonary department holds meetings to discuss the clinical pathway of community acquired pneumonia. Variations in length of stay obtained associated with copeptin levels. Copeptin levels can be used as a benchmark to determine the length of stay.

Implementation stage

The results of the action phase that it was agreed to propose to the director through the medical committee to revise the clinical pathway of community acquired pneumonia patients

B. Cycle 2

Planning stage

The head of the pulmonary department proposed a change in the clinical pathway for community acquired pneumonia patients to the director through a medical committee.

Data collection stage

The medical committee invited the directors in this matter to be represented by hospital medical services unit, together with representatives of the pulmonary department discussing

The clinical pathway changes in community pneumonia patients. Results of the meeting the results of the implementation phase talks were discussed again whether the revision was acceptable.

Action planning stage

The results of the action phase were obtained that Dr. Moewardi has not approved the examination of copeptine levels for routine examinations in patients with pneumonia, but it is only allowed for research. The hospital will carry out clinical pathway evaluation properly, a clinical pathway workshop will be held together with other care provider professionals such as nurses, pharmacists and nutritionist because that the clinical pathway evaluation has only been carried out by medical groups.

Implementation stage

A clinical pathway workshop was held in the making of a clinical pathway together with other care providers such as nurses, pharmacists and nutritionist. The notes from the clinical pathway from the medical group, nurses, pharmacy and nutritionist all stated that there was an improvement in the evaluation of clinical pathway in Dr. Moewardi by involving all care professionals. Community acquired pneumonia (CAP) is a syndrome in which acute pulmonary infection develops in people who have not been hospitalized and have never been exposed regularly to the health care system. [8] [9]

Biomarkers, combined with clinical risk scores are used to identify specific patients at risk, to assess the severity of the disease and the prognosis of CAP and to assist in the selection of antibiotic therapy but the cost is still expensive so it is rarely used. [10] The results of this study indicate that copeptin levels obtained OR values = 36.000 (3.193-405.897) which means that pneumonia patients with copeptin levels> 23.21 risk 36 (3.193-405.897) times greater with length of stay> 10 days compared to patients with copeptin levels <23.21. High-risk CAP, elevated copeptin levels reflect levels of progressive septic disease or newly developing heart or kidney disease all of which require more intensive monitoring and management.(Kolditz et al., 2012).

Fisher exact test results p = 0.001 (p <0.05) means that there is a significant relationship between copeptin levels and length of stay of CAP patients, then copeptin levels can be used as predictors of length of stay.

ICP evaluation of 90% for anticipation throughout patient care in the form of a sheet that lists daily activities including the process and outcome and 70% ICP evaluation for not many variants.

Clinical pathway can also be used for evaluating antibiotic treatment in pneumonia patients with length of stay. [11 The first clinical pathway was used by the nursing profession and integrated document forms as a tool to provide care to patients. The measurable and structured clinical pathway first used in 1985 at New England Medical Center Hospitals (NEMC) di Boston, US. The clinical pathway was developed to address three main problems: to help doctors integrate different clinicians, to manage patients concurrently, and to manage care with the aim of reducing patient hospitalization costs. The purpose of clinical pathways is to guide patient care. Case managers follow the patient's progress every day, record deviations from the clinical pathway, and implement corrective actions as needed. [12]

The main function of clinical pathway evaluation are:

1. Measures of compliance with professional practice, e.g. adherence to recommended practices, to the quality and quantity of documentation, and others identified in the study including during the observation process.
2. Objectively measuring patient outcomes: mortality, morbidity, hospitalization, complications, adverse effects, performance status and another outcomes identified in the studies included during the observation process.

The secondary function of clinical pathway evaluation is the evaluation of treatment action processes, evaluation of economic value and provider evaluation, e.g. staff satisfaction. (Rotter et al., 2013).

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